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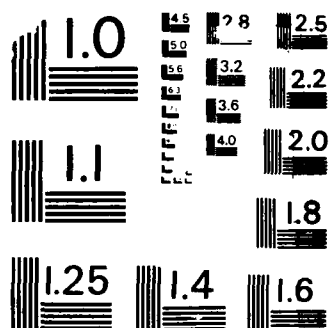
STATE-LEVEL PROJECTIONS OF POTENTIAL DEFENSE OUTLAYS:  
AN INTRODUCTION TO (U) OFFICE OF THE UNDER SECRETARY  
OF DEFENSE RESEARCH AND ENGINEE 1988

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STATE-LEVEL PROJECTIONS  
OF  
POTENTIAL DEFENSE  
OUTLAYS

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AN INTRODUCTION TO RDEIMS



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An Introduction to RDEIMS

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## 1. INTRODUCTION

The Department of Defense (DoD) has developed a system for projecting potential defense expenditures in each of the 50 states and the District of Columbia. The projections are made available on request to firms, state and local government planning agencies, trade associations, and other organizations with a serious interest in defense markets in particular geographic regions.

The estimates are intended to serve as benchmarks. They describe the future pattern of defense and defense-related expenditures assuming that each state's shares of the various components of defense activity remain what they have been in recent years. Actual spending patterns will, of course, be determined by competition for defense contracts, and so may differ from historical distributions. The projections cannot forecast such changes. They do, however, account in detail for the effects of changes in the composition of defense spending on the geographic distribution of expenditures.

This booklet is directed to those who intend to use the projections. It explains how the projections are produced and offers some guidelines for interpreting them.

The projections are made using a new tool, the Regional Defense Economic Impact Modeling System (RDEIMS). RDEIMS is an extension of the Defense Economic Impact Modeling System (DEIMS), a forecasting system developed by DoD to project defense purchases of the products of various industries. DEIMS is described in a separate booklet, Defense Purchases: An Introduction to DEIMS; a detailed description of the state-level projections for 1984-89 is presented in The Geographic Distribution of Potential Defense Expenditures. Both of these documents may be obtained from the DoD contacts listed at the front of this booklet.

The remainder of the booklet walks through some sample projections, describes how they are made, and discusses the sources of uncertainty in them. Attached at the end of the booklet is a form for ordering projections for particular states or industries. Along with the order form is a card designed to get your views on the projections and this booklet. Your comments will help us improve both the usefulness of the projections and the format in which they are presented.

## 2. SAMPLE STATE-LEVEL PROJECTIONS

RDEIMS projections are made for defense expenditures in the 50 states and the District of Columbia. Projections are also made of the geographic distribution of defense purchases from each of 77 industrial sectors.

The projections are presented in two formats, one designed to show the level and composition of expenditures in individual states, and the other to show the geographic distribution of purchases from given industrial sectors.

### State Tables

Table 1 illustrates the format of the state-by-state projections, using the forecast for New Mexico as an example. The top portion of the table shows the dollar value of projected direct and indirect defense expenditures in the state during each of the forecast years. <sup>1/</sup> For purposes of comparison, a projection of nondefense economic activity, prepared by Data Resources, Inc. (DRI), is also provided. The second and third blocks of the table show the industrial sectors projected to lead in defense or defense-related sales, or to experience the most rapid growth in such sales, over the forecast period.

Thus, in 1985, some \$2.3 billion is projected to be spent in New Mexico for defense or defense-related purposes. Of that amount, nearly \$1.3 billion will be disbursed by the Defense Department to pay its employees and reimburse its direct suppliers for the goods and services they provide; the remaining \$1.0 billion represents estimated purchases that these firms and individuals

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<sup>1/</sup> "Direct defense expenditures" are the monies disbursed by the Defense Department to pay for purchases of goods and services or to cover payroll expenses. Purchases of magnetic recording tape by the Defense Logistics Agency and the wages of military and civilian DoD personnel at Kirtland Air Force Base are two examples of such expenditures. This spending, in turn, triggers subsequent rounds of transactions, referred to collectively as "indirect defense expenditures." These expenditures, which are generated throughout the economy, involve two types of purchases: purchases by DoD's prime contractors (and their suppliers) of parts and materials used in producing items ordered by DoD; and purchases by DoD's military and civilian employees of goods and services for their personal use. Fuel bought by a trucking firm for transporting a shipment of goods to DoD, or forgings purchased by an aircraft manufacturer for incorporation into a jet fighter would fall into the first category of indirect expenditures; a clock radio purchased by a DoD employee is an example of the second. The personal consumption expenditures of military and civilian employees may be taken as the indirect effects of the pay portion of the DoD budget. These are included in RDEIMS (but not other parts of DEIMS) because they are often a focus of attention in local development efforts.

**TABLE 1**  
**PROJECTED DEFENSE EXPENDITURES IN**  
**NEW MEXICO**

SUMMARY  
(MILLIONS OF 1983 DOLLARS)

	1983	1984	1985	1986	1987	1988	1989
DEFENSE							
DIRECT	1,167.0	1,225.1	1,269.3	1,341.1	1,414.2	1,469.6	1,517.6
INDIRECT	846.5	939.1	1,037.8	1,138.2	1,226.7	1,283.3	1,329.8
TOTAL	2,013.5	2,164.2	2,307.2	2,479.3	2,640.9	2,752.9	2,847.4
NONDEFENSE	27,380.2	29,164.7	30,419.4	31,680.6	33,232.6	34,762.9	36,056.5
TOTAL	29,393.7	31,328.9	32,726.5	34,159.9	35,873.5	37,515.8	38,904.0

LARGEST SECTORS  
(MILLIONS OF 1983 DOLLARS)

DIRECT DEFENSE

82. FEDERAL GOVERNMENT WAGES & SALARIES	704.6	716.8	705.9	724.5	750.4	773.5	794.0
11. NEW CONSTRUCTION	88.0	96.6	104.5	118.0	133.8	143.7	151.1
73. BUSINESS SERVICES	40.8	45.3	50.9	56.4	61.4	65.1	68.3
65. TRANSPORTATION & WAREHOUSING	38.9	40.9	44.7	47.3	49.8	51.5	53.1
31. PET REFINING & REL. PROD.	38.5	40.1	43.2	45.9	48.3	49.7	51.1

INDIRECT DEFENSE

8. CRUDE PETROLEUM & N. GAS	118.1	145.2	171.0	187.3	203.9	207.1	209.5
68. UTILITIES	91.4	97.4	104.3	111.9	118.5	122.5	125.6
73. BUSINESS SERVICES	67.4	77.3	88.8	100.6	109.7	116.3	122.2
69. WHOLESALE & RETAIL TRADE	65.2	69.6	73.6	78.9	84.2	88.2	91.5
71. REAL ESTATE & RENTAL	55.6	61.0	64.8	70.5	76.2	80.9	85.0

MOST RAPIDLY GROWING SECTORS  
(ANNUAL AVERAGE PERCENT GROWTH 1984 TO 1989)

DIRECT DEFENSE

35. GLASS & GLASS PRODUCTS	20.35
49. GENERAL INDUSTRY MACHINERY	17.53
42. OTHER FAB. METAL PRODUCTS	16.62
46. MATERIALS HANDLING MACH. & EQ	13.93
52. SERVICE INDUSTRY MACHINES	13.84

INDIRECT DEFENSE

13. ORDNANCE & ACCESSORIES	16.3
51. OFFICE, COMPUTING & ACCT. MACH	13.6
56. RADIO, TV, & COMMUNICATION EQ	11.5
32. RUBBER & MISC. PLASTICS PROD	10.7
9. STONE & CLAY MINING & QUARRYING	10.6



in turn will make. With regard to direct spending, pay to service members and government workers will account for the bulk of DoD's expenditures in the state (\$700 million), while potential purchases from the glass and glass products sector will show the most rapid growth (20.3 percent). In terms of defense-related expenditures, sales of fuel will absorb the largest share of indirect defense dollars (\$1.2 billion), with potential purchases from the ordnance and accessories sector estimated to grow at the most rapid rate (16.3 percent).

### Industry Tables

Tables 2 and 3 illustrate the format of the industry projections, using estimated purchases from the Radio, Television, and Communications Equipment sector as an example. (This sector consists of standard industrial code (SIC) industries 365 and 366.) Two tables are provided for each of 77 industrial sectors, the first showing the states in which the sector is projected to make the bulk of its direct defense sales over the forecast period and the second showing the states in which its indirect defense sales are projected to be concentrated. Altogether, the states represented in each table are estimated to account for at least 75 percent of the annual defense or defense-related business of the sector in question. To aid in comparing the state-level figures, estimates of each sector's total direct and indirect defense sales over the forecast period are included.

### General Characteristics of the Projections

It is important to remember that the figures presented in these tables are projections. The estimates of direct defense expenditures are based on historical shares of defense prime contracts awarded to various industrial sectors and on the geographical distribution of DoD's military and civilian employees. As will be discussed in more detail below, the indirect purchase estimates reflect the distribution of industrial employment.

Several general characteristics of the estimates should be noted:

- o The projections are stated in constant (that is, inflation-adjusted) dollars and are organized by calendar year.
- o The projections are based on the President's budget and so reflect planned expenditures, not actual appropriations or budget authority.
- o The projections reflect DoD expenditures only for military programs only. They do not include expenditures for civil programs administered by the Defense Department or defense-related expenditures by other federal agencies.

**TABLE 2**  
**PROJECTED DIRECT DEFENSE EXPENDITURES**

56. RADIO, TV, & COMMUNICATION EQ.  
(MILLIONS OF 1983 DOLLARS)

STATE	1983	1984	1985	1986	1987	1988	1989
CALIFORNIA	4,068.7	4,649.1	5,278.6	5,902.0	6,485.7	6,953.7	7,289.7
FLORIDA	739.9	849.3	973.5	1,089.1	1,196.6	1,283.9	1,346.5
MARYLAND	1,111.0	1,265.4	1,444.2	1,629.6	1,801.9	1,934.3	2,031.8
MASSACHUSETTS	1,191.9	1,368.1	1,563.1	1,750.1	1,923.1	2,059.8	2,158.3
NEW JERSEY	623.0	706.6	806.5	903.4	994.0	1,061.6	1,109.3
NEW YORK	1,844.9	2,077.0	2,357.0	2,645.3	2,908.7	3,110.0	3,254.3
TEXAS	1,187.7	1,352.0	1,548.9	1,753.8	1,951.3	2,101.3	2,206.8
VIRGINIA	699.1	795.0	902.3	1,007.4	1,101.3	1,173.0	1,224.6
OTHER	3,874.8	4,405.4	4,989.5	5,532.4	6,043.7	6,456.2	6,750.1
TOTAL	15,830.8	18,027.6	20,510.9	22,949.1	25,229.7	27,018.9	28,297.6

**TABLE 3**  
**PROJECTED INDIRECT DEFENSE EXPENDITURES**

56. RADIO, TV, & COMMUNICATION EQ.  
(MILLIONS OF 1983 DOLLARS)

STATE	1983	1984	1985	1986	1987	1988	1989
CALIFORNIA	788.8	903.0	1,053.7	1,234.5	1,345.2	1,412.0	1,466.7
FLORIDA	242.8	276.6	332.8	401.2	447.1	474.8	497.4
ILLINOIS	439.6	515.3	612.1	691.5	728.2	744.3	759.0
INDIANA	249.5	293.7	342.6	378.7	394.9	402.0	406.6
MARYLAND	196.7	225.4	267.3	315.1	342.0	357.9	373.5
MASSACHUSETTS	286.7	331.6	392.7	460.4	498.6	519.8	539.0
NEW JERSEY	242.6	269.9	313.6	358.5	379.0	387.8	397.0
NEW YORK	280.6	308.2	357.5	408.4	430.7	442.8	454.8
TENNESSEE	108.1	131.4	153.3	175.7	190.2	198.5	203.8
TEXAS	277.9	314.2	374.5	447.6	496.8	525.8	549.2
VIRGINIA	112.0	127.7	149.4	171.5	180.9	185.0	189.1
OTHER	1,035.1	1,182.6	1,394.2	1,617.2	1,753.0	1,825.5	1,886.3
TOTAL	4,357.2	4,992.3	5,873.9	6,810.4	7,351.2	7,651.3	7,906.4

- o The projections apply only to expenditures made in the United States; they exclude the cost of imported products or items bought abroad.
- o The projections differ in some important ways from the national-level DEIMS estimates, as explained in the box below.

These points should be borne in mind when comparing the state-level estimates with national DEIMS projections, budget data, or published industry statistics.

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#### Relationship of the RDEIMS Estimates to the DEIMS National Projections

The RDEIMS estimates of potential defense expenditures differ from the DEIMS projections in four important ways. First, whereas the DEIMS projections consider aggregate defense purchases from particular industries, the RDEIMS projections focus on expenditures in individual states. Second, the RDEIMS data are organized by industrial sector rather than by industry. That is, the 77 sectors considered in the RDEIMS projections are aggregations of the 400 industries represented in the DEIMS estimates. Thus, for example, the sector labeled Radio, TV, and Communications Equipment (Sector 56) comprises four industries for which separate national-level DEIMS projections are available: Radio and TV Receiving Sets (319), Phonograph Records and Tape (320), Telephone and Telegraph Equipment (321), and Radio and Television Communication Equipment (322). (The correspondence between the DEIMS industries and Standard Industrial Code classifications is explained in Defense Purchases: An Introduction to DEIMS.) Third, unlike the DEIMS estimates, which focus solely on purchases, RDEIMS estimates include the salaries of DoD personnel, both military and civilian, and military retirement pay. These expenditures are reported as Federal Government Wages and Salaries (Sector 82). Fourth, the estimates of indirect defense expenditures include personal consumption expenditures by DoD personnel. These figures can be viewed as a rough indicator of the indirect purchases arising from DoD pay.

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### 3. HOW THE ESTIMATES ARE DEVELOPED

This section describes how the state-level estimates of direct and indirect defense expenditures are developed. The computations themselves are elementary. Their form is as follows:

$$\begin{array}{lcl} \text{State "I's" share of} & & \text{National total} \\ \text{defense expenditures} & \times & \text{defense expenditures} \\ \text{in category "J"} & & \text{in category "J"} \end{array}$$

Estimates of total defense expenditures (or of some component of total expenditures) in a state are calculated by summing the estimates across the appropriate expenditure categories. Understanding how the estimates are computed is, then, a matter of knowing which categories of expenditures are considered and how the state shares are established. <sup>1/</sup>

#### Categories of Defense Expenditures Used in Making the Estimates

The state-by-state estimates are made using a "top down" approach. The point of departure is the annual defense budget, submitted to the Congress each January, and the corresponding Five-Year Defense Plan. The budget data are the main inputs to DEIMS. DEIMS takes this information and converts it into projected purchases from some 400 industries across the country. These outputs of DEIMS are used to make the RDEIMS estimates of expenditures at the state level.

The state-level estimates cover expenditures originating from six aggregate accounts of the defense budget: military personnel; procurement; research, development, test, and evaluation (RDT&E); operations and maintenance (O&M); military construction; and military retired pay. These accounts cover the military functions of the Department of Defense. Civil functions, such as the public works projects of the Army Corps of Engineers, are not included.

Three categories of information from DEIMS are used:

- o Pay projections, both for active-duty and retired military personnel and for DoD's civilian work force;
- o Projected direct defense purchases from each of 400 Standard Industrial Classification (SIC) industries; and

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<sup>1/</sup> A more complete explanation of the methods used to make the state-level estimates is presented in Data Resources, Inc., Documentation of the Regional Economic Impact Modeling System (forthcoming).

- o Projected indirect defense purchases from each SIC industry. 2/

The following sections discuss each of these categories in turn.

#### DoD Pay

Historically, the distribution of DoD pay among states has differed significantly from the distribution of direct purchases. Consequently, in estimating future levels of defense expenditures, it is useful to treat pay and purchases separately. This requires some transformation of the budget data because pay expenditures are not grouped into a single account. With the exception of the retired pay account, which consists entirely of pay, all of the budget accounts cover both purchases and pay. 3/

DEIMS separates outlays from each budget account into pay and purchases components. The pay portions cover the wages and salaries of military and civilian DoD personnel, whether they are stationed in the United States or abroad. Because the state-level estimates consider only expenditures made in the United States, the aggregate pay data must be adjusted to remove the fraction of pay disbursed outside the country.

The adjustment involved is quite substantial. In 1981, about 28 percent of the active-duty force was stationed overseas, or aboard ships in foreign waters. An estimate of these individuals' pay is subtracted from total military pay in order to arrive at an estimate of the amount of pay going to military personnel stationed in the United States. (Though service members stationed outside the country do not necessarily receive all of their pay abroad, there is no simple way to determine what proportion is received by dependents living in the United States, or how those funds are distributed among the individual states.) Although some civilian personnel are also stationed overseas, their numbers are comparatively small, so no adjustment is made to the civilian pay estimates.

#### Direct Defense Purchases

DEIMS separates the purchases components of the budget accounts into estimates of direct defense purchases from each of 400 SIC industries. Table 4 reports the results for the 50 industries projected to account for the largest

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2/ See Defense Purchases: An Introduction to DEIMS for a detailed explanation of how the national-level estimates are made.

3/ Although the military personnel account consists primarily of pay, it also covers some purchases. Likewise, although most of DoD's civilian work force is paid from the O&M account, other accounts also pay for civilian employees.

TABLE 4

ESTIMATED DIRECT DEFENSE PURCHASES  
FROM 50 LEADING INDUSTRIES, 1983 TO 1989  
(Millions of 1983 Dollars)

INDUSTRY	1983	1984	1985	1986	1987	1988	1989
322. RADIO&TV COMMUNICATION EQUIP	17,385	19,869	22,592	25,269	27,766	29,703	31,107
335. AIRCRAFT	12,076	13,941	16,219	18,349	18,731	17,691	17,009
338. SHIPBUILDING & REPAIRING	8,492	9,201	10,026	10,808	11,637	12,276	13,046
45. COMPLETE GUIDED MISSILES	5,750	6,732	7,734	8,689	9,415	10,045	10,536
336. AIRCRAFT ENGINES&ENGINE PARTS	4,931	5,453	6,210	6,952	7,360	7,450	7,534
337. AIRCRAFT PARTS & EQUIP,NEC	4,305	4,727	5,300	5,840	6,180	6,293	6,351
301. ELECTRIC MEASURING INSTR	3,942	4,599	5,281	5,796	6,004	6,073	6,179
385. MISC. BUSINESS SERV	3,316	3,788	4,320	4,764	5,098	5,409	5,674
181. PET. REFINING & RELATED PROD	3,545	3,713	4,022	4,288	4,537	4,703	4,866
291. ELECTRONIC COMPUTING EQUIP	2,771	3,263	3,853	4,534	5,082	5,439	5,723
161. INORGANIC & ORGANIC CHEM	2,559	2,821	3,128	3,400	3,668	3,887	4,073
46. AMMUNITION,EX SMALL ARMS,NEC	2,405	2,646	3,001	3,461	3,979	4,504	4,928
367. AIR CARRIERS & RELATED SERV	2,292	2,453	2,699	2,841	2,970	3,058	3,130
346. MEASURING & CONTROL INSTR	1,787	2,081	2,386	2,607	2,683	2,711	2,760
50. OTHER ORDNANCE & ACCESSORIES	1,951	2,154	2,374	2,566	2,695	2,753	2,817
333. MOTOR VEHICLES	1,662	2,035	2,345	2,527	2,594	2,669	2,798
396. NONPROF ORGS & MISC PROF SERV	1,431	1,723	2,061	2,352	2,558	2,749	2,909
365. MOTOR FREIGHT	1,775	1,884	2,060	2,147	2,240	2,301	2,372
375. WHOLESALE TRADE	1,648	1,831	2,048	2,224	2,408	2,547	2,663
345. ENGINEERING & SCIENTIFIC INST	1,502	1,701	1,920	2,103	2,216	2,277	2,350
44. MAINTENANCE & REPAIR,OTHER	1,549	1,674	1,790	1,945	2,108	2,213	2,305
47. TANKS & TANK COMPONENT	1,265	1,331	1,446	1,499	1,558	1,586	1,608
370. COMMUNICATIONS, EX RADIO & TV	1,231	1,297	1,411	1,515	1,606	1,668	1,732
366. WATER TRANS & RELATED SERV	1,194	1,254	1,363	1,407	1,450	1,474	1,507
382. HOTELS & LODGING PLACES	1,072	1,197	1,345	1,424	1,475	1,524	1,573
49. SMALL ARMS AMMUNITION	1,013	1,097	1,310	1,611	1,994	2,353	2,617
372. ELECTRIC UTILITIES	1,090	1,156	1,218	1,313	1,404	1,459	1,505
387. MISC PROFESSIONAL SERV	808	886	1,002	1,128	1,262	1,349	1,426
395. EDUCATIONAL SERV	821	864	940	1,006	1,062	1,100	1,143
40. NEW MILITARY FAC.	747	864	890	938	985	1,020	1,048
260. STEAM ENGINES & TURBINES	730	785	819	827	847	862	888
43. MAINTENANCE & REPAIR, RESIDENT.	703	758	760	808	870	900	913
271. MACH TOOLS,METAL CUTTING	658	707	738	801	838	880	914
351. OPTICAL INSTRS & LENSES	458	552	643	725	853	1,050	1,270
334. MOTOR VEHICLE PARTS & ACCESS.	537	582	632	663	694	720	750
321. TELEPHONE & TELEGRAPH EQUIP	475	550	624	695	796	914	1,007
388. EATING & DRINKING PLACES	506	560	624	657	685	712	737
363. RAILROADS & RAIL-RELATED SERV	517	555	609	641	676	701	724
393. HOSPITALS	481	506	552	590	625	647	669
243. FAB PLATE WORK(BOILERSHOP)	468	511	551	598	646	673	704
270. INDUST. TRUCKS & TRACTORS	398	426	486	566	644	697	726
22. NEW RES MULTI FAMILY HOUSING	428	463	467	499	539	559	568
304. MOTORS & GENERATORS	327	381	430	479	526	554	579
381. REAL ESTATE	353	388	402	440	478	499	511
167. EXPLOSIVES	351	351	378	423	474	532	589
273. SPECIAL DIES,TOOLS,ACCESSORIES	322	353	375	404	412	407	406
392. DOCTORS & DENTISTS	322	342	373	396	418	435	449
347. SURGICAL & MEDICAL INSTRS	270	322	361	397	454	500	535
51. MEAT PACKING PLANTS	262	286	340	349	357	362	367
397. SOCIAL SERV,NEC	289	303	332	357	384	401	415

dollar volume of direct defense purchases in 1985. The purchase estimates are computed using what is referred to as the DEIMS "translator." The translator is constructed from detailed studies of the purchases funded by various accounts of the DoD budget and, especially, the pattern of purchases involved in the acquisition of major weapons systems. In broad terms, the translator describes--account by account--the shares of outlays that go to purchase the outputs of various SIC industries. 4/

As is the case with pay, some adjustments of the initial figures are required in order to arrive at estimates of purchases in the United States. First, an estimate of goods purchased abroad for use abroad (called "noncomparable imports") is removed. (These purchases consist largely of petroleum.) Next, an estimate of goods purchased abroad for consumption in the United States is deducted. In making this calculation, it is assumed that imports constitute the same share of defense purchases of the products of various industries as they do of nondefense purchases from those industries. Estimated purchases from each industry are adjusted in this way in order to arrive at an estimate of domestic purchases.

After the adjustments have been made, the estimated direct purchases from the 400 SIC industries are aggregated into purchases from 77 industrial sectors. This is done so that the estimates will conform with those for indirect defense expenditures, which, because of data limitations, are made at the 77-sector level.

The direct purchase estimates are computed separately for each of five aggregate accounts of the DoD budget--procurement, O&M, RDT&E, military construction, and military personnel. The result is, then, for each aggregate account, projections of domestic direct defense purchases from each of the 77 industrial sectors. Table 5 illustrates the outcome, using projected purchases arising from the O&M account as an example. After the purchases have been allocated by sector, they are distributed at the state level on the basis of state shares of direct purchases arising from each budget account.

Note that this procedure does not assume that a state's share of defense purchases from a given sector, and funded by a given account, will equal its share of the purchases from that sector that arise from other accounts. To the contrary, for purchases from each industrial sector, a number of share figures are calculated for each state, corresponding to the share of purchases arising from individual budget accounts. A given state's share of purchases from a given sector therefore varies across the accounts.

This procedure has the very important advantage of reflecting the effects of changes in the composition of defense purchases, but it requires very

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4/ Documentation of the translator is contained in Institute for Defense Analyses, The Defense Translator (forthcoming).

TABLE 5

**ESTIMATED DOMESTIC O&M PURCHASES  
BY INDUSTRIAL SECTOR, 1983 TO 1989**  
(Millions of 1983 Dollars)

INDUSTRY	1983	1984	1985	1986	1987	1988	1989
4. AGR., FORESTRY, & FISHERY SERV.	1	1	1	2	2	2	2
7. COAL MINING	12	13	13	15	16	17	17
11. NEW CONSTRUCTION	1,574	1,657	1,784	1,912	2,023	2,101	2,180
13. ORDNANCE & ACCESSORIES	1,754	1,861	2,000	2,147	2,269	2,347	2,404
16. FABRIC, YARN & THREAD MILLS	2	2	2	3	3	3	3
17. MISC. TEXTILE GOODS	0	1	1	1	1	1	1
18. APPAREL	6	6	7	7	7	7	7
19. MISC. FABRICATED TEXTILE PROD.	12	13	13	14	15	15	15
20. LUMBER & WOOD PRODUCTS	3	3	3	3	3	3	3
21. WOOD CONTAINERS	1	1	1	1	1	1	1
22. HOUSEHOLD FURNITURE	2	2	3	3	3	3	3
23. OTHER FURNITURE & FIXTURES	99	102	111	120	127	132	140
24. PAPER & ALLIED PRODUCTS	44	45	49	53	56	58	61
25. PAPERBOARD CONTAINERS & BOXES	1	1	1	1	1	1	2
26. PRINTING & PUBLISHING	163	171	185	199	210	218	226
27. CHEMICALS & PRODUCTS	1,638	1,705	1,851	1,982	2,104	2,184	2,260
28. PLASTICS & SYNTHETIC MATLS.	5	5	5	5	6	6	6
29. DRUGS, CLEANING & TOILET PREP.	56	59	63	68	72	74	77
30. PAINTS & ALLIED PRODUCTS	1	1	2	2	2	2	2
31. PET REFINING & REL. PROD.	3,074	3,190	3,453	3,676	3,874	3,991	4,110
32. RUBBER & MISC. PLASTICS PROD.	138	145	157	169	179	186	192
34. FOOTWEAR & OTHER LEATHER PROD.	42	44	49	52	55	57	59
35. GLASS & GLASS PRODUCTS	2	2	2	2	2	2	2
36. STONE & CLAY PRODUCTS	217	226	247	265	282	294	304
37. PRIMARY FERROUS METALS	110	118	127	136	144	149	153
38. NONFERROUS METALS	101	104	112	120	127	132	136
39. METAL CONTAINERS	27	28	31	33	36	37	38
40. FAB. STRUCTURAL METAL PRODUCTS	285	299	327	351	374	388	400
41. SCREW MACHINE PROD. & STAMPINGS	54	57	62	66	70	73	77
42. OTHER FAB. METAL PRODUCTS	175	183	199	214	227	236	245
43. ENGINES & TURBINES	78	82	87	93	97	100	102
44. FARM & GARDEN MACHINERY	1	1	1	2	2	2	2
45. CONSTR. & MINING MACHINERY	41	44	47	50	53	54	55
46. MATERIALS HANDLING MACH. & EQ.	149	154	168	180	191	198	209
47. METALWORKING MACH. & EQ.	26	29	31	33	35	37	38
48. SPECIAL INDUSTRY MACHINERY	19	20	21	23	24	25	25
49. GENERAL INDUSTRY MACHINERY	58	61	65	69	73	75	77
50. MISC. NONELECTRICAL MACH.	12	13	14	15	15	16	16
51. OFFICE, COMPUTING & ACCT. MACH.	290	304	331	354	374	388	402
52. SERVICE INDUSTRY MACHINES	13	14	15	16	17	17	17
53. ELECTRICAL MACHINERY	170	178	192	205	217	224	228
54. HOUSEHOLD APPLIANCES	1	1	1	1	1	1	1
55. ELECTRIC LIGHTING & WIRING EQ.	3	3	3	3	3	4	4
56. RADIO, TV, & COMMUNICATION EQ.	2,079	2,178	2,361	2,535	2,687	2,784	2,875
57. ELECTRONIC COMPONENTS & ACCESS.	70	73	78	84	88	91	93
58. MISC. ELECTRICAL MACH. & EQ.	29	30	32	34	35	36	37
59. MOTOR VEHICLES & EQUIPMENT	245	262	282	301	319	330	344
60. AIRCRAFT & PARTS	4,405	4,629	5,015	5,399	5,721	5,897	6,045
61. OTHER TRANSPORTATION EQ.	3,860	4,045	4,452	4,786	5,153	5,370	5,482
62. INSTRUMENTS & SUPPLIES	529	551	597	638	675	700	731
63. OPTICAL, OPHTHALMIC & PHOTO EQ.	38	40	42	45	47	48	49
64. MISC. MANUFACTURING	7	7	7	8	8	8	9
65. TRANSPORTATION & WAREHOUSING	2,481	2,608	2,839	3,043	3,223	3,344	3,467
66. COMMUNICATION EXC. RADIO & TV	1,214	1,278	1,387	1,486	1,572	1,631	1,693
68. UTILITIES	1,063	1,117	1,196	1,266	1,359	1,405	1,456
69. WHOLESALE & RETAIL TRADE	768	806	879	955	1,004	1,043	1,083
70. FINANCE & INSURANCE	1	1	1	2	2	2	2
71. REAL ESTATE & RENTAL	82	89	91	98	101	103	106
72. PERSONAL SERVICES EXC. AUTO.	347	367	393	421	442	457	473
73. BUSINESS SERVICES	1,748	1,848	1,994	2,132	2,249	2,334	2,422
74. EATING & DRINKING PLACES	146	154	164	176	186	192	199
75. AUTOMOBILE REPAIR & SERVICE	176	186	202	217	231	241	249
77. MISC. SERVICES	1,946	2,046	2,232	2,392	2,537	2,635	2,731



detailed information on historical state shares of direct defense expenditures. As is described below, this information is available from a number of sources.

### Indirect Defense Expenditures

Indirect purchases are triggered by purchases made directly by DoD. Each indirect purchase, in turn, typically generates a series of subsequent purchases. The following discussion describes how these sequences of transactions are reflected in the estimates of indirect defense purchases and notes an important limitation of the estimates.

To begin with a simple example, an indirect defense purchase is generated when a radio manufacturer buys transistors for the radio it sells to DoD. In this case, the indirect purchase (of transistors) is made by a prime contractor to DoD. This is not, however, always the case. Indirect purchases can--and in important instances do--arise through a series of transactions. Examples of indirect purchases involving several steps are:

- o Purchases of forgings by firms that produce landing gear for military aircraft; and
- o Purchases of transportation services for shipment of test equipment to a firm that produces optical instruments incorporated in fire control systems.

In the first of these cases, there are two indirect defense purchases: (1) of landing gear by the aircraft prime contractor; and (2) of forgings by the producer of the landing gear. There is a sequence of three indirect defense purchases in the second case: (1) of optical instruments by the producer of the fire control systems (the prime contractor); (2) of test equipment by the supplier of optical instruments; and (3) of transportation services by the supplier of the test equipment.

Although indirect defense purchases constitute a sizable share of total defense spending, only fragmentary data on their geographical distribution are available. Moreover, as the examples above suggest, assembling a reasonably complete data series would be a very large undertaking. Such purchases can readily be estimated, however, using an input/output (I/O) table.

DEIMS uses the I/O table maintained by Data Resources, Inc. (DRI), which is an updated version of the 1972 table prepared by Bureau of Economic Analysis of the Department of Commerce. The DRI table has one column for each of 400 commodity groups (industries). Each column shows the shares of the total cost of producing the commodity in question accounted for by purchases of various other commodities. For example, the column for optical instruments would show purchases of test equipment and other commodities required to produce those instruments.

The computations proceed along the lines of the examples given above. The point of departure is a listing of the dollar value of direct

defense purchases from each of the 400 industries in the I/O table. The coefficients in the table are then used to compute the dollar volume of the inputs that must be purchased from each industry in order to produce this bill of final purchases. For example, if engines account for 15 percent of the cost of military aircraft, each \$100 million in DoD aircraft purchases generates an estimated indirect purchase of \$15 million worth of engines.

The computation does not stop at this point. The I/O table is also used to compute "inputs to the inputs" (for example, forgings used in jet engines), "inputs to the inputs to the inputs" (the titanium used in producing the forgings incorporated in jet engines), and so on through successive rounds of production. Purchases from a given sector, in each successive round, are then summed to yield an estimate of indirect defense purchases from that sector. (The process is truncated after a comparatively small number of rounds because the total value of requirements becomes quite small. This happens because at any given round, only a fraction of total cost represents purchases from other sectors.)

The results are estimates of the indirect defense purchases that arise from the nonpay portion of the DoD budget. The pay portion of the budget also has indirect effects, and these are a focus of attention in economic development efforts, especially at the local level. Consequently, in making the state-level estimates, indirect defense purchases are defined as the sum of: (1) indirect purchases stemming from the purchases component of the DoD budget; and (2) consumption expenditures (broken out by industrial sector) of defense personnel. The latter is included as an admittedly crude measure of the economic activity that stems from the pay portion of the DoD budget.

It has sometimes been questioned whether indirect purchases--computed in the manner described above--involve double counting. The simple answer is "no." The value of each pound of, say, aluminum that goes into defense production (however indirectly) is counted only once. It is true, however, that the summation of indirect defense purchases from different sectors typically will involve double counting.

Returning to an earlier example, consider a firm that sells \$50 million worth of landing gear to a DoD prime contractor and buys \$15 million worth of forgings (to produce the landing gear) from another firm. The sum of the two indirect defense purchases is \$65 million. But this figure involves double counting in that the \$50 million received by the seller of the landing gear reflects the \$15 million cost of the forgings.

The fact that the summation of indirect purchases involves double counting in this sense is not a unique characteristic of these estimates. It is characteristic of all of the commonly used data on total value of output or shipments of various industries. Double counting can be avoided only if industry outputs are stated in terms of value added (that is, the total value of output less the cost of purchased inputs).

Nevertheless, the fact that the estimates of indirect defense purchases measure gross output, and not value added, must be borne in mind. The estimates can be legitimately compared with data on nondefense gross output. There is also no serious objection to comparing indirect defense purchases in various regions, and the estimates might be useful for other purposes. But because they include an element of double counting, the estimates of indirect defense purchases should not be compared with gross state product or be used in gauging defense-related employment. For the latter purpose, breakouts by industrial sector--which do not involve double counting--should be used.

Once indirect purchases have been estimated for each of the 400 industries, the computations proceed in much the same way as those for direct defense purchases. Specifically, estimated imports are subtracted (industry by industry) from the purchase figures, and the adjusted estimates are then aggregated to the 77-sector level. There is no basis, however, for estimating how state shares of indirect purchases (from a given industrial sector) vary depending on the budget account from which the purchases originate. Consequently, in making the state-level estimates, indirect purchases are not computed separately for each of the budget accounts. Instead, indirect defense purchases from each of the 77 sectors, reflecting the entire nonpay component of the DoD budget, are used to estimate purchases at the state level.

### Estimation of State Shares

State shares of DoD pay and direct purchases are calculated on the basis of historical data showing how those expenditures have been distributed at the state level in recent years. Since adequate historical data on the distribution of indirect defense purchases are not available, a somewhat different method is used to calculate state shares of those purchases. This section describes how state shares are established for each category of expenditures, and notes the potential limitations of the methods.

#### State Shares of Pay

Estimated outlays for military pay are allocated among the states on the basis of their shares of total military pay in 1981. These shares are held constant over the projection period. Military retired pay and civilian pay likewise are distributed among the states on the basis of the distribution in 1981.

Because the state distributions are fixed at the 1981 levels, increases in military or civilian pay (or in military retirement annuities) over the projection period can affect only the estimated amount of pay going to each state, not each state's share relative to other states. That is, if the amount of military pay disbursed in state "x" in 1981 were twice that disbursed in, state "y," the estimates for each future year would show twice as much military pay being disbursed in state "x" as in state "y."

This "fixed shares" assumption would lead to serious distortions in the estimates only if there were major changes in the number of personnel within given states (or in the distribution of personnel among pay grades) over the projection period. States with large shares of military or civilian pay typically also have a large number of military installations, and closure of one (or even several) of those facilities is not likely to produce major changes in the states' shares of DoD's military or civilian payroll. (Base realignments and closures since 1981 have been minimal.)

#### State Shares of Direct Defense Purchases

DoD does not maintain records of outlays for purchases on a geographic basis. The Defense Acquisition Data Management System, however, does record prime contract awards by location, and most DoD purchases are made on the basis of such contracts. (The term "prime contract" does not refer exclusively to contracts for large weapons systems.) These data can be used to estimate historical state shares of direct defense purchases--arising from the different budget accounts--from each of the 77 industrial sectors.

To do this, it is first necessary to:

- o Group prime contract awards according to the budget account that funded them; and
- o Establish a correspondence between the Federal Stock Codes by which prime contract awards are recorded and the SIC codes used in DEIMS.

A second step is required because the data cover contract awards, rather than outlays. Contracts typically generate outlays over a period of years. Consequently, a state's share of contract awards in any given year is not as good a measure of its share of outlays in that year as is its average of awards over a period of years. For this reason, the state shares used in making the RDEIMS estimates are established on the basis of contracts awarded over a three-year period (1979-1981).

The Defense Acquisition Management Data System (also known as the Prime Contract Data Base) alone cannot be used to estimate state shares of purchases arising from every budget account because it does not permit a complete partitioning of prime contract awards by account. A data base maintained by Defense Marketing Service, Inc., a private concern, has the necessary partitions for the procurement and RDT&E accounts, and so, for purchases arising from those accounts, it is used (with the aid of a crosswalk between Federal Stock Codes and Standard Industrial Codes) to compute the state shares of direct defense purchases from each sector. A part of the Prime Contract Data Base is used to compute state shares of direct purchases arising from the O&M and military construction accounts. Information on state shares of purchases from the nonpay portion of the military personnel account is not available. These purchases (broken out by industry) are distributed among the states in proportion to their shares of the labor force of the industry in

question. That is, if "x" percent of the workers in a given industrial sector work in state "y," it is assumed that "x" percent of the purchases from that industry arising from the nonpay portion of the military personnel account are made in state "y." Table 6 summarizes, for each of the accounts, the data used to compute the state share estimates.

The state shares for each combination of budget account and industry are held constant throughout the forecast period. The estimates do not, therefore, reflect changes in the geographic pattern of contract awards for any given industry. Because disaggregated state shares are used, the estimates reflect changes in the relative size of the budget accounts, and in the mix of purchases funded by each account.

#### State Shares of Indirect Defense Purchases

Indirect defense expenditures are distributed among the states on the basis of their shares of the total employment in each of the 77 industrial sectors. Thus, a state accounting for 5 percent of the national employment in the electronic equipment industry would be allocated 5 percent of the estimated indirect defense expenditures on electronic equipment.

The allocation of indirect purchases reflects the industries that supply those purchases and where those industries are located. Because industrial location is not static, changes in locational patterns must be taken into account. This is done using forecasts of industrial location trends developed by DRI's Regional Forecasting Service. Projected shifts in industries' locations are incorporated in the share estimates used to distribute indirect defense expenditures. If, for example, a state's share of employment in the semiconductor industry is projected to grow over time, so would its share of projected indirect defense expenditures on semiconductors. If, on the other hand, a state's share of employment in a particular industry were projected to decline, its share of the indirect purchases from that industry would also be projected to decrease over time.

State-level estimates of indirect defense expenditures are produced by tallying the individual industry estimates for each state. Though the distribution of defense purchases by an industry may not always correspond with that industry's general location, such divergences (whether for one industry, or even a few industries) will not greatly affect the state-level totals.

TABLE 6  
SOURCES OF HISTORICAL STATE SHARES  
OF DIRECT DEFENSE PURCHASES

Aggregate Budget Accounts	Sources of Data
Procurement Research, Development, Test, and Evaluation	State shares (for each industrial sector) computed using the DMS data base and the DRI crosswalk between Federal Stock Codes and SIC codes
Operations and Maintenance Military Construction	State shares (for each industrial sector) computed using the Prime Contract Data Base for 25 product categories and the crosswalk between those categories and SIC codes
Military Personnel	State shares of purchases (from each industrial sector) assumed to equal state shares of national employment in each sector

#### 4. UNCERTAINTIES IN THE ESTIMATES

The RDEIMS estimates of direct defense expenditures rest upon data showing the historical distribution of purchases from given industrial sectors. The indirect defense expenditure estimates, in contrast, rest on an assumption that a state's share of the indirect defense purchases from a sector is the same as its share of the total employment in that sector. Although this assumption appears to be reasonable, it is clear that the degree of uncertainty is larger for the indirect state-level estimates than it is for the estimates of direct defense expenditures.

Both the direct and indirect expenditure estimates reflect projected changes in the composition of the DoD budget over the forecast period. Increases in planned purchases of ships or aircraft, for example, will lead to higher estimated expenditures in states that build ships and aircraft or that supply goods used in their production. The RDEIMS estimates assume that each state's shares of the various components of defense activity will remain what they have been in recent years. The estimates therefore do not account for possible changes in the geographic pattern of purchases caused by competition among firms located in different states.

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The following pages provide a list of the states and industries for which RDEIMS projections are available. To order projections, simply complete the form attached at the end of this booklet. Be sure to include the order numbers for the series you are requesting.



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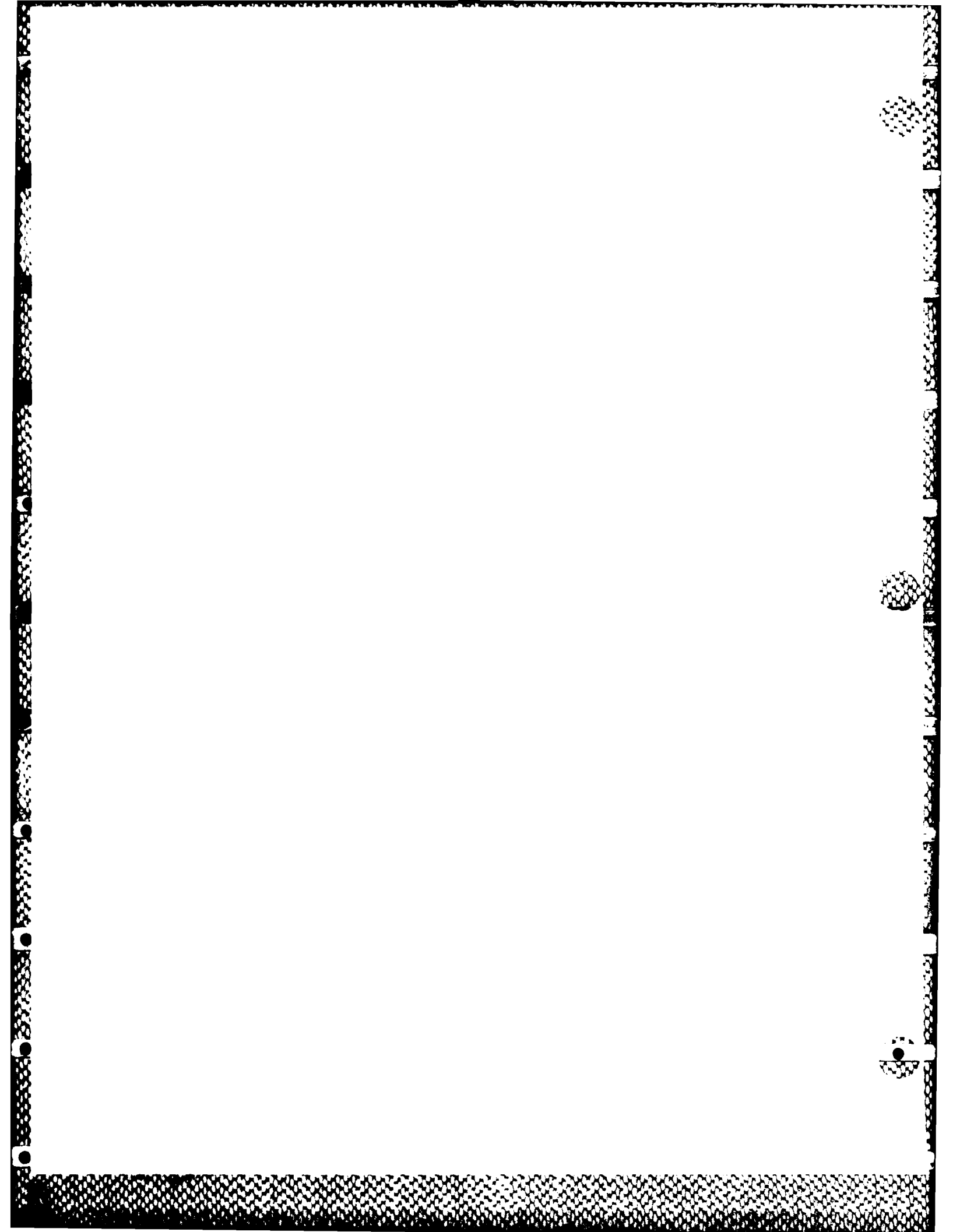
R1	Agricultural Products	1 - 11
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R15	Tobacco Manufacturers	95 - 98
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R18	Apparel	107 - 109
R19	Miscellaneous Fabricated Textile Products	110 - 111
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2. Did the projections for your industry or state seem to be reasonable?

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_____	Projected geographic distribution of direct purchases	_____
_____	Projected geographic distribution of indirect purchases	_____
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